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CONTENTS

FRONT COVER: *Circus Rider, by T. Keeley (Dyestuffs Division)*

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I.C.I.'s New Titanium Process—2

By N. P. Inglis (Metals Division Research Director)

Last month General Chemicals Division explained how, in the first stage of titanium manufacture, they start with an oily liquid called titanium tetrachloride and finish up with a powder. Here is the next instalment of this fascinating story—the story of how Metals Division turns this titanium powder into the sheet, tube and wire required by the aircraft industry and others.

THE Metals Division share in the I.C.I. titanium venture is to transform the raw titanium powder into the bars, sheets, wire and tube required by the aircraft and other industries. The first step is to melt the titanium and produce an ingot which can be forged, rolled, extruded or otherwise "worked" into the required shape.

The melting of titanium presents the metallurgist with many difficult technical problems. In the first place, its melting point is very high—about 1700° C., or 200° C. higher than that of steel. Secondly, molten titanium very readily combines with oxygen, nitrogen, carbon, and many other chemicals.

Impurities Hazard

Since the presence in the titanium of even small quantities of such impurities hardens the metal and makes it less malleable, they must at all costs be avoided. So titanium cannot be melted in contact with air, and all melting must be carried out in a vacuum or under a blanket of argon or helium.

Another headache is that molten titanium will combine with all known refractories, so that it cannot be melted in a refractory crucible or in a furnace lined with refractory, as is so often the practice when melting other metals.

This very difficult problem of containing the metal while it is being melted has been solved in an ingenious way by arc melting in a water-cooled copper crucible. Although copper melts at a temperature some 600° C. lower than titanium, a copper crucible can be used to hold molten titanium provided the copper is kept very well cooled with water. The copper crucibles used by the Metals Division are surrounded by an outer jacket, and water is kept continuously circulating through the space between jacket and crucible. A gastight lid is fitted to the crucible, and the electrode passes into the crucible through a gastight gland.

Metals Division have used a graphite electrode mounted in a water-cooled holder, and have devised special methods whereby contamination of the melt by carbon from the electrode is reduced to a minimum. In this method of melting an electric arc is struck between the electrode and a small quantity of titanium powder pellets at the bottom of the crucible. These pellets are made up at Witton from the titanium powder which arrives from Wilton, often with the addition of alloys. When the first lot of pellets in the crucible have been melted, additional pellets are fed in by a special feeding device. As these in turn are melted and the ingot grows, the electrode is raised so that the ingot is gradually built up.

A New Method

With this method there is a danger of contamination of the ingot by carbon from the graphite electrode; and although special devices and techniques have been developed to minimise such contamination, Metals Division has also worked on a method of melting which employs a titanium electrode. In this method, known as the consumable electrode method, the electrode is made by compacting the titanium powder into a block with the required electrical characteristics. Unlike the graphite electrode, this compacted titanium electrode is not cooled. Consequently when the arc is struck the electrode melts and the ingot is built up by the progressive melting of the electrode, there being no feed of pellets as with the graphite electrode melting method.

With both these methods the crucible must first be evacuated and then filled with argon, since contact with even small quantities of air or other gases during melting would completely spoil the melt. Some six years ago, when the Metals Division Research Department started research on the melting of titanium, their first furnace produced an ingot weighing 5 lb. Today ingots weighing 400 lb. are being produced regularly, and ingots of 800 lb. have been made; in the very near future we expect to make ingots of over 1000 lb. weight as a matter of routine.

Dressing the Ingot

When the ingot is cast there is still a long way to go before the metal is in the form which the user requires. First the surface of the ingot has to be "dressed" so as to remove surface blemishes. The dressed ingot is then heated so that it can be forged into a slab for processing into sheet, or a suitably sized cylinder for subsequent rolling into bar.

Heating to forging temperature must be done with extreme care, because at forging temperature the surface of the metal oxidises. This oxidised layer has to be removed after forging, and as it cannot be re-used it becomes scrap—very expensive scrap. In any heating operation, therefore, both the temperature and the duration of the process must be rigidly controlled.

Hot and Cold Rolling

When the forged slab (now about 24 in. × 24 in. × 3 in.) has been machined to remove the oxidised layer it is once again heated, and then rolled while hot in a reversing mill. The hot slab passes back and forth through rolls time after time, until finally the thickness is reduced to about $\frac{1}{5}$ in. The hot rolled sheet is cleaned, either in special chemical baths or by shot-blasting or by scouring with suitable abrasives. It is then further reduced by cold rolling to the required size, which may be as thin as ten thousandths of an inch—no easy task, since titanium and its alloys are very strong and not particularly amenable to the cold rolling process. Moreover, the metal becomes progressively stronger and less ductile as cold rolling proceeds, so at carefully determined stages it has to be softened by annealing before further cold rolling.

At present all this cold rolling is carried out on mills normally used for rolling copper and brass. As it takes longer to roll titanium, a considerable amount

A TITANIUM INGOT *being withdrawn from the furnace where it is reheated before forging. These furnaces are electrically heated to prevent contamination of titanium by hydrogen.*

of work on copper and brass products is now being displaced. To deal with this situation the I.C.I. Board has sanctioned the building of a new plant solely for the rolling of titanium and titanium alloys, and this plant will be at Waunarlwydd Works, Swansea, South Wales.

As well as doing research and development work associated with melting, rolling, extruding and drawing titanium, Metals Division is devoting considerable attention to the properties of the metal and its alloys. We are testing its ability to withstand the conditions under which the customer will use it, studying how best to meet the special requirements of the user, and learning how the wrought metal can best be machined, welded and otherwise fabricated into the final shape which is wanted.

It would be quite impossible in such a short article as this to give even a brief survey of all this work, but one or two examples may illustrate the type and magnitude of the effort.

When titanium was first discovered it was thought that with its high melting point it would be particularly strong at high temperatures. Tests carried out in the I.C.I. Creep Test Station showed that the metal is somewhat disappointing in the extent to which it "creeps" or stretches if stressed for a very long time at elevated temperatures. This disappointing result provided an immediate challenge to the metallurgists, who set about devising alloys more resistant to these creep conditions. This challenge is being very successfully met, since alloys now available show a very much improved performance under creep test as compared with the metal itself. We also feel confident that we shall achieve still better results as research in this field continues.

So far, interest in titanium has been confined almost entirely to the aircraft industry. This is understandable, because a metal which is as strong as steel but only half the weight is obviously attractive to aircraft and aero engine designers, who are always seeking ways and means of reducing weight.

The properties of titanium and titanium alloys are so attractive to these men that, even so early in its technological life, the metal is already being used for blades in the compressors of jet engines and for firewalls and bulkheads. In the near future it is expected that it will

(*Continued on page 41*)

THE PROGRESS OF TITANIUM. *Treated with sodium, the oily liquid titanium tetrachloride is converted into titanium granules by General Chemicals Division at Wilton. The granules are then turned into pellets by Metals Division, often with the addition of alloys; and after melting, forging and rolling, the pellets become a unique metal, as strong as steel and about half the weight.*

One man and his job—39

FUSE-SPINNER

"TRAMPLE on it with hobnailed boots; bend it double; soak it; freeze it—and it still burns perfectly." That was how one explosives expert expressed to me his opinion of Bickford-Smith safety fuse, which has a kind of Rolls-Royce reputation throughout the world.

This reputation is jealously guarded and puts special responsibility on the 500 men and women who make the fuse at Nobel Division's Bickford-Smith factory at Tuckingmill in Cornwall. In this friendly huddle of cream-washed buildings, where the smell of the sea competes with the smell of blackpowder, the processes for making fuse have changed little in the last hundred years.

There is no automatic reverence here for doing things grandfather's way, but William Bickford struck almost unerringly on the best methods and the best materials when he first patented the fuse in 1831.

His problem was to enclose a train of blackpowder in such a way that it would burn at a stated speed even under the worst conditions. So he wrapped jute threads round the blackpowder and waterproofed them with pitch, gutta-percha and varnish. The processes involved are much the same now in principle. Take fuse-spinning—the process by which the jute is wrapped round the train of powder. Bickford, inspired by the ropemaker's methods, first employed a man to walk backwards with a contrivance strapped round his waist. As blackpowder poured through a funnel he turned a handle which twisted jute threads from a number of spools round the powder. Later he devised a machine to do the same job, and virtually the same machines are used today, tended by operators who are still known as fuse-spinners.

One of them, Kathleen Whittle, tried to tell me about her job in the intervals between tending her machines. Each machine bears two contra-rotating plates loaded with spools of jute thread. Ten threads, called the spinning jutes, are wound in one direction, and six, called the countering jutes, are wound in the other, wrapping the blackpowder neatly and strongly. Kathleen's main preoccupation is to see that spools are replaced just before they are exhausted, tying the new end to the old with a reef knot. She probably ties more reef knots in the course of a shift than a sailor does in a lifetime.

Two slightly moist cotton threads run down the centre of the fuse and act as a kind of rallying point for the blackpowder. The spools of cotton needed renewing in the same way as those of jute, Kathleen explained to me as she flew from machine to machine, whipping spools on and off and tying her lightning knots.

"What happens if a jute thread breaks?" I asked her. She showed me the neat little tripping arrangement which stops the machine when a breakage occurs—one of the innumerable small refinements added since William Bickford's day.

"When that happens and two or more threads are out," said Kathleen, "I have to mark the small place by cutting the fuse and tying it."

"Small place" is the homely term for a section of fuse that contains less than its quota of blackpowder or fewer than the proper number of spinning or countering jutes. The strictest possible system is used in the factory to detect the presence of "small places," mark them, record them, and see that none of them is included in a length of fuse that leaves the factory.

I saw this system in action as I followed the fuse on the rest of its journey through the factory. After the long reels of fuse leave Kathleen they go straight to an inspection department. Every "small place" marked with a knot by Kathleen is cut out and the sound ends rejoined—but the place is marked again with a red thread. In addition, every inch of fuse passes through a gauge which gives the alarm if the thickness falls below a certain fine limit; "small places" found in this way are also cut out and marked. Every "small place" is noted on a history sheet that accompanies the reel of fuse throughout the factory.

The next step is to waterproof the fuse. In a fine long room it passes through baths of bitumen and gutta-percha —the latter is specially made at a subsidiary factory. Now a handsome brick red, it goes to have two cotton yarns wound about it for extra protection. On top of this comes a final coat of varnish made from glue and china clay. When it is dry the fuse is cut into straight lengths or wound into coils, with never a "small place" included. M.J.D.

Kathleen Whittle

Information Notes

THE LANGUAGE BARRIER: CAN MACHINES HELP?

By B. C. Vickery (Akers Research Laboratories)

The importance of scientists in one country keeping track of the work of their opposite numbers in other countries is obvious. Not the least of the difficulties is that of language. Here the librarian of the Akers Research Laboratories surveys the language barrier and suggests how mechanical translators might be used to free the translation bottleneck.

This article is an extract from a paper read to the Library Association Conference last autumn.

WHAT is it that we need in order to keep track of foreign scientific publications? Ideally, we need first of all a list of all books and papers published. This bibliography should be such that we can search it either by subject or by author.

Our second need is to have available full translations, or at least précis, of the more important foreign papers. For each fundamental science, important papers are usually confined to quite a small number of journals. Therefore to translate half a dozen Russian chemistry or physics journals might well be sufficient to gain a pretty sound knowledge of their basic work in these fields. Such translation schemes already exist, and to extend them to other sciences, and to other languages, would be very valuable.

. . . paid particular attention

Our third need is to have facilities for getting a translation specially made of any particular paper. It is this problem with which librarians such as myself are particularly concerned, for in specialist organisations it is usually the librarian who is expected to arrange for translations. He wants them to be quick, cheap and accurate. In far too many cases he is disappointed on all three counts.

I have recently analysed some records of about seventy translations of scientific papers made by commercially available translators and obtained the following figures. For German the cost was about 9s. 6d. a page, the speed of delivering translations was about one day per page; Russian cost about 19s. a page, speed 1½ days per page; and Japanese costs 54s. a page, speed 3½ days per page.

It is clear that reliance on spare-time commercial translators is a slow business. Moreover, the results are not always accurate. One learns by experience that a particular translator can only be trusted in certain subject fields—the experience is sometimes comical and sometimes very annoying. It is particularly difficult to find a translator who is at home among a wide range of technological terminologies, knowing both the foreign and the English jargon for industrial equipment and processes. This difficulty is enhanced by the scarcity of good technical language dictionaries.

It is this bottleneck in the translation process—the lack of bilingual scientists—which has stimulated recent research on mechanical translation. It should be understood that MT, as it is familiarly known, does not aim at the complete mechanisation of translation—feeding a Japanese text into one end of the machine and getting out a piece of English prose from the other. MT is a mechanical aid to translation in which *part* of the work is handed over to a machine. Roughly speaking, the job of the machine is to look up foreign words in a dictionary and record their English meanings, at the same time recording information about the tense or case of each word. The raw product is then handed over to a subject specialist for editing.

Such a partnership between man and machine has been experimentally shown to be possible. The kind of material which relatively simple machines of this type produce is shown in the following examples:

1. *From the Dutch:* The disease come thus very rapid up and has in many case a total amiss crop then followed. *Edited version:* The disease thus appears very rapidly, and a total crop failure has then followed in many cases.
2. *From the French:* It not is not astonish of establish that hormones of growth act on certain species, then that not operate on of other. *Edited version:* It is not surprising to learn that growth hormones may act on certain species but have no effect on others.
3. *From the Swedish:* If earth been freeze long and deep, has no injury of clover rot get. *Edited version:* If the earth has been frozen for a long time and to a considerable depth, no injury due to clover rot has resulted.

It is clear that once you get used to a machine's literary style, editing is relatively easy. Languages with a word order close to English (for example, scientific Russian) would be easier to handle than, say, German. The advantage of mechanical translation is that the editor, though he must know both the target language and the subject field well, no longer needs to know the source language. On the other hand, the cost of designing and constructing machines will be high, and it may well be preferable to spend the time and money training more bilingual experts.

Whether mechanical aids are used or not, it is certain that translations for science would benefit by the further organisation of translators into bureaux. There already exist such organisations for the translation of business correspondence, but the practice should be more widely extended in science.

In our own Company both Head Office and some of the Divisions have small translation sections, which give valuable service of the kind we require. All librarians in the Company have also pooled their knowledge of external commercial translators, enabling Head Office Translation Section to compile a list of many dozens of names, covering over twenty languages. Each name is accompanied by a note as to the subjects which the translator is best fitted to tackle.

Another form of co-operation which has been developing is for a number of translators specialising in a certain subject field to get together to compare notes. For example, twenty-five translators of textile articles met in Manchester during 1954 and paid particular attention to a problem I have mentioned earlier, the lack of good technical language dictionaries. They agreed on the need to collect and exchange information about new terms and meanings in their field, and this is now being effected by the publication of a bi-monthly magazine. An electrical translators' bulletin has also been established.

This piecemeal co-operation, valuable as it is, has still not really got to the heart of the problem. Today about half the world's scientific publication is in English. French and German each account for only 15%, Russian for perhaps 10%, and a number of other languages for the remaining 10%. The widely distributed Spanish-speaking peoples can read in their native language only 2–3% of the world's scientific literature.

There is a very real need for wider discussion and action on a national scale to find ways of breaking down further the language barrier in science.

I.C.I.'S NEW TITANIUM PROCESS—2 (*continued from page* 37)

be used for aero engine compressor discs, nuts and bolts, landing gear, and high-pressure control tubes. Further, if the speeds of aircraft rise further in the supersonic range, aerodynamic heating (i.e. the heating due to friction between the airstream and the outside of the aircraft) will become so great that the aluminium alloys now used for making the airframe may prove unsuitable, and titanium alloys of very special alloy steels will have to be used.

However, study is being made of those properties of the metal and its alloys which might widen its applications to other industries. For example, much work has been done by both General Chemicals and Metals Divisions on the outstanding corrosion resistance of titanium alloys, which in most conditions is greater than that of stainless steel. As the largest makers of condenser tubes in this country Metals Division have devised tests which subject the metal to sea-water under conditions many times more onerous than those likely to be encountered in practice. After suffering one of these drastic tests for a period of 1000 hours, even the metal used by the Admiralty for condenser tubes (which has a long and proved record of successful service under difficult marine conditions) can fail because the tube wall is penetrated. Under exactly the same test, titanium is practically unstained after 10,000 hours.

Then again, all readers will by now be familiar with the phenomenon known as fatigue of metals, i.e. the fact that if any metal is subjected to alternating or pulsating stress it will fail in time under a stress much lower than that required to cause failure in a single application. It is perhaps not so generally appreciated that if a metal is subjected to alternating stress and *at the same time* even a mild corrosive medium is present, then the stress causing breakage can be much lower still. Corrosion fatigue tests, as they are called, have been carried out on titanium in the presence of both sea-water and alternating stress, and the results shown are truly amazing.

It is now known that with titanium the presence of sea-water has no effect on the metal's resistance to alternating stress—in other words, that the corrosion fatigue limit in sea-water and the air fatigue limit are the same. Even the most resistant of the stainless steels cannot match this particular performance.

It is not surprising, therefore, that those closely associated with this venture feel that this combination of strength, lightness and corrosion resistance, together with the opportunity of improving these properties still further by rational alloying, must surely open up a large field of use for this new metal.

During the five or six years' gradual unveiling of titanium's mysteries we have had our successes and our failures, our moments of joy and our moments of depression. But throughout there has always been the satisfaction of knowing that we were pioneering in territory well worth exploring and the feeling that the new metal must play a growing part in the industrial life of the country.

OPEN DAY AT IMPERIAL CHEMICAL HOUSE

By Michael Danckwerts (News Editor)

Open Day at I.C. House is something rather special. It is the day on which I.C.I. throws open its doors to the outside world and invites others to hear what we are doing in the field of Work Study. Important people give up valuable time to attend and are deeply impressed.

ONCE a month some twenty-five important people meet in a second-floor lecture room in Imperial Chemical House. There are usually two or three trade union leaders among them; a dozen chairmen or directors of large companies; half a dozen admirals, major-generals and air marshals; and perhaps a journalist from an influential weekly.

They come—some at their own request, some by invitation—to learn as much about Work Study as can be compressed into a single day. They leave at the end of the day, it is hoped, with a new awareness of the need for Work Study if the country is to prosper—or even to survive.

These Work Study Open Days, as they are called, began three years ago, when random requests to I.C.I. for information about the subject grew to such proportions that they could not be dealt with individually. Since then, 1000 of the most influential people in British and foreign industry, politics and armed services have attended the "days." At a typical one recently the list of guests included the Minister for Economic Affairs of the Foreign Service of the U.S.A.; the general secretary of the National Union of Agricultural Workers; the Permanent Secretary and Director-General of Manning from the Air Ministry; two directors of a glass company; the distribution manager of a pharmaceuticals company; the personnel director of a steel company; and directors of telephone, engineering and shoemaking companies. There have also been special days for self-contained groups—members of the Board of Admiralty, the productivity committee of British Railways, and the European Productivity Agency of O.E.E.C., for instance.

The list of people who have managed to spare a day from their busy lives to attend Open Days is impressive; no less so are the comments of these people on what they heard. Such epithets as "inspiring," "immensely stimulating," "impressive" and "completely convincing" are commonplace in their letters. So, too, are confessions that the day had left them in something of a whirl. A motor cycle manufacturer, after admitting he was "quite ashamed and shocked" for not having been alive and up to date enough to apply Work Study methods in his own factories, concluded his letter: "I came away completely mentally exhausted—more so than I have ever been in my life."

To compress into a single day a picture of Work Study and the benefits it can bring, in a manner that will "inspire," "impress," "convince," "stimulate" and even "mentally exhaust" top management, calls for speed and sincerity blended into a technique not far removed (if one may make the comparison without profanity) from that of the evangelical meetings recently seen in Britain. For three years the Central Work Study Department has whittled at the Open Day timetable, groomed its team of speakers and polished its techniques to such effect that one guest was heard to remark at the end of the day that he felt as if he had been in the ring with Rocky Marciano and Billy Graham at the same time.

While the detailed content of the days is never the same twice, the pattern is always the same. Sir Ewart Smith, carrying a double punch, as it were, as a deputy chairman of I.C.I. and chairman of the British Productivity Council, opens the proceedings by welcoming the guests. Then he sails into the attack: "Work Study, gentlemen, must start with management—and with top management at that." He follows this with a succinct account of why Work Study is necessary if Britain is to prosper, illustrated with a graph comparing the rise in the American rate of productivity with our own. The facts are well known enough now in I.C.I., but judging by the almost visible pricking up of ears among the guests they will still bear repetition outside.

The unpalatable message is delivered with a sincerity that the most self-complacent captain of industry would find it hard to withstand. Now the stage is taken by Mr. R. M. Currie, head of Work Study Department. His style is frankly histrionic, but the facts he unfolds deserve every bit of drama they can get. "In the United States a man earns the price of a pound of steak in 32 minutes. In Britain it takes 84 minutes." Up goes another lantern slide. (It is always the right one, it is always the right way up; embarrassing pauses and angry thumpings for the lights to be switched on or off are unknown—facts which never fail to impress visitors.)

Mr. Currie moves from the general to the particular in his exposé of the need for Work Study. And he sounds a few warning notes: "Experience and inspiration are fickle masters." "Industry is of men, not machines." He then awards his guests a "cocktail" in the form of a concrete example of the benefits Work Study brings; lantern slides show how management reorganised a whole factory, with lists of figures giving the rise in output, saving in costs and money earned in incentives.

Time is made available during the Open Days for informal discussions. Here Mr. J. Cooper (centre) and Mr. D. Basnett (right), chairman and education officer respectively of the National Union of General and Municipal Workers, put a question to Mr. R. M. Currie.

Particularising further, Mr. Currie's deputy sets out the techniques of Work Study—techniques that can only be mastered after weeks of classroom work and years of practical experience, and which must here be reduced to almost metaphysical terms. The practical application of the techniques is demonstrated by another speaker, with illustrated case histories of successful applications.

The cupboard having been opened to reveal its contents, the guests are now invited to ransack it in open discussion. A director of a large London store asks what proportion of Work Study officers to employees he would need. The president of the A.E.U. observes that although Work Study still retains for some people the taint of the old time and motion study technique, the trade unions need no convincing of its worth. Another guest asks how Work Study staff should be recruited. A doctor enquires about the assessment of compensating rest.

A "brains trust" of three answers these questions—making no claim to omniscience, but offering all that I.C.I. possesses in the way of experience. Most of the answers are illustrated by lantern slides, miraculously relevant.

There is a danger that what is necessarily a facile interpretation of a complicated subject may inspire a visitor to install a make-shift Work Study department and apply ill-conceived schemes in haste. The talks during the day are peppered with warnings against this, and a summing-up by Mr. Currie at the end of the day emphasises these warnings. He also invites guests to come back to I.C.I. for any further help they need, and in fact the department's files bulge with letters asking for advice, for literature, and often for the opportunity of sending another member of the firm to an Open Day.

The technique of the Open Days suggests high-pressure salesmanship, but it has this curious difference from the term as generally understood: what is being "sold" is something intangible—an attitude of mind—and it is not being sold so much as given away. It is a matter of Board policy that what I.C.I. knows about Work Study shall be no secret; that, on the contrary, it shall be shouted from the rooftops.

Garden Notes

By Philip Harvey

Illustrated by Joan Milroy

WHY are the flowering peaches so seldom seen in gardens? They are comparatively easy to grow, preferring a warm soil which is not deficient in lime. Compared with the majority of flowering almonds or cherries they are slow growing. For example, the deep pink *Kanzan* or *Hisakura*, which is probably the most widely planted of all flowering cherries in this country, may ultimately attain a height of 45 ft. with a spread of 30–40 ft.

Flowering peaches do not usually exceed 18 × 18 ft. The two best-known varieties are *Prunus persica Clara Meyer*, which bears masses of rosette-shaped rich pink flowers, and the bright red *Russell's Red*. There is no flowering cherry, almond or plum which can be compared for colour with *Russell's Red*, and if you can provide a spot which is sheltered from crippling east and north winds the tree will go ahead more quickly.

In warm summers it is often possible to gather a fair crop of edible peaches from *Russell's Red* or *Clara Meyer*. In my experience the fruits taste just as delicious as those from the purely fruiting varieties like *Peregrine*, *Rivers' Early* or *Duke of York*. They are, of course, rather smaller.

All peaches grown outdoors are very prone to the disease known as peach leaf curl, a trouble which is rarely serious under glass. The first symptoms appear as the leaves unfold and are very easy to detect, infected leaves becoming swollen and blistered with a characteristic reddish-purple hue. Diseased foliage eventually dies, turns brown and falls to the ground. Flowers and young fruits may also be attacked. Failure to tackle peach leaf curl means a reduction in both quality and quantity of crop, as well as a definite loss of vigour. As flowering peaches do not crop regularly or freely like apples and plums, you should make every effort to stimulate fruiting.

FORTUNATELY leaf curl is not difficult to prevent. Spraying with a copper fungicide, lime-sulphur or Bordeaux mixture just before the buds start to swell—usually in late February or early March, depending on the season—is a definite insurance against attack. If your garden is near the sea, keep a special look-out for this disease, as the relatively high humidity encourages infection.

Do you really like parsnips? I make no apology for saying that I find them unappetising. However, it seems only fair when writing gardening articles to discuss occasionally one's dislikes or even pet aversions (I must remember to cover lettuces and spinach at the appropriate times!).

To return to parsnips. Unless you are a potential exhibitor at the local show, grow a variety with smaller-size roots. Like the globe beet and stump-rooted carrots, these smaller-size parsnips are just as good eating as the large exhibition varieties—experts assure me that they taste even better, especially if made into parsnip fritters or cut in chips and fried. No comment!

Selected Offenham and *The Student* are popular varieties, the latter doing especially well in the north. Half an ounce of seed will sow a row about 90 ft. long. Parsnips require a long growing season. If the weather is open and the soil sufficiently warm, late February or early March sowings are probably best. A deep, well-worked soil which has been generously manured for a previous crop is ideal. Do not manure ground intended for parsnips just before sowing, since this causes the roots to fork and crack, as with carrots.

DRILLS for parsnips should be 1 in. deep (rather less on heavy ground) and at least 12 in. apart. Parsnip seed germinates very slowly, and it is a good plan to mix with it a little radish or lettuce seed. These vegetables germinate quickly, enabling one to mark the position of the parsnip drills and hoe without disturbing the seeds.

Make your first sowing of broad beans about mid-February. Unlike parsnips, practically every seed germinates. Allow about 4 in. between individual seeds, sowing 2 in. deep. One pint of seed will suffice for a 50 ft. row. Broad beans are not fussy about soil, although some gardeners prepare the ground as they would for peas, i.e. digging two spits deep and working in plenty of organic material such as compost, hop manure, and well-rotted farmyard manure.

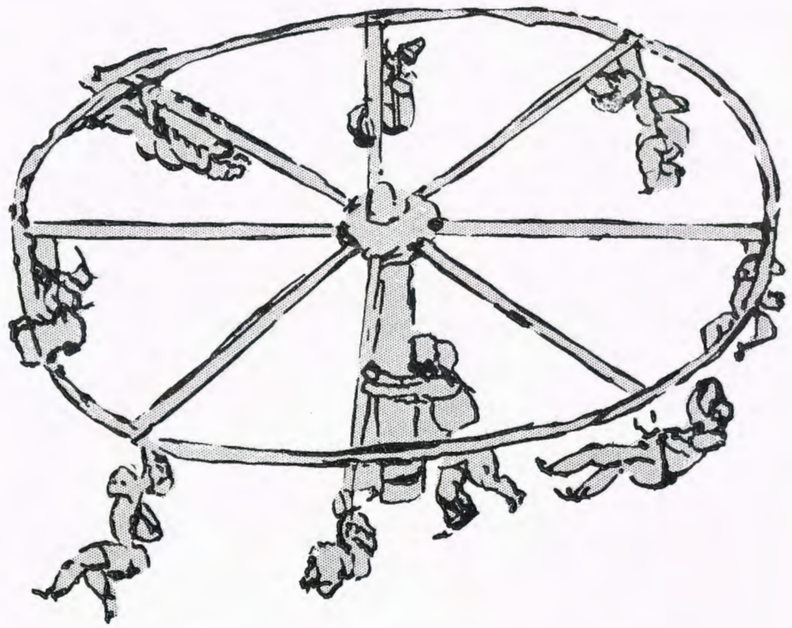
SOME hardy perennials are best planted in early spring rather than autumn. Examples are pyrethrums, scabious, kniphofias, campanulas, anchusas, *Anemone japonica*, and the Amellus section of Michaelmas daisies (*King George*, *Moerheim Gem* and similar varieties). Plant as soon as possible after mid-February so that these perennials can re-establish themselves before a prolonged dry spell, accompanied by cold winds, arrives.

Lupins can usually be moved any time between October and March. Have you tried some of the newer named Russell lupins? It is by no means easy to select the best, as the general standard is so high, but you can safely choose any named kind. For a deep yellow I would suggest *Tom Reeves*; *Canary Bird* is a paler yellow. The tallest of the Russells is *Gladys Cooper*, which reaches 4½ ft. and is a delightful smoky blue. *Betty Astell* is a rich, deep pink and *Lady Newport* a brilliant combination of cerise and crimson.

Merry-Go-Round

By Peter Le Neve Foster (Head Office)

Roundabouts are an essential part of the fun of the fair. The story of how they have gradually become more elaborate since first seen at St. Bartholomew's Fair in 1729 is here told by one who is a lifelong follower of the circus.



THE EARLIEST KNOWN ROUNDABOUT. *This drawing of a primitive seventeenth-century Turkish roundabout is by Peter Mundy of Penryn, a Cornishman who travelled through Europe and through Asia between* 1600 *and* 1660.

No one knows how the roundabout found its way across Europe from Turkey until it reached England in time for St. Bartholomew's Fair in 1729. But having arrived, it grew in popularity and became more and more elaborate.

The early roundabouts were built by wheelwrights. They were, basically, simply large cartwheels revolving horizontally on an axle stuck in the ground with little seats for children attached to the spokes. By 1800 wooden horses to carry grown-ups had been added, and by 1833 quite elaborate machines were being produced with boats suspended from an overhead wheel. Popularity, too, gave rise to a new terminology. The axle became, in fairground language, the "centre pole," the cartwheel the "spinning top" and the spokes "swifts."

All these early machines relied for motive power on men who rotated them by means of capstan bars. Even as late as the second half of the last century this was an accepted form of drive. A roundabout of this type (built about 1865) is described in detail in Lord George Sanger's *Seventy Years a Showman*. Only gradually was man-power replaced by ponies harnessed to the outside of the machine.

THE THREE-ABREAST GALLOPER *roundabout in action at a Scottish fairground—a photograph taken by N. F. Savage of Nobel Division*

They trotted round and round in brightly coloured harness. There is still one pony-driven roundabout in operation. It is touring in the West of England and is believed to be the last survivor of an all but extinct line.

The credit for first applying—or rather trying to apply—steam as a motive power goes to a Mr. Soames. But his "Steam Circus" built in 1875 was not successful because of trouble with the belt drive. A few years later it fell to Frederick Savage of Kings Lynn to produce the first successful steam-driven roundabout. The Savage Centre Engine, as it was called, drove direct into the centre pole. It dominated the fairground until steam began to be replaced by electricity in 1911. There are now few, if any, steam-driven roundabouts operating in this country, but a

By courtesy of The Parker Gallery

ST. BARTHOLOMEW'S FAIR—*a Rowlandson print published in* 1808. *On the left is a primitive roundabout. This fair was held in West Smithfield, London, on St. Bartholomew's Day, which is 24th August, from* 1133 to 1855. *For centuries the fair lasted a fortnight, but in* 1691 *it was shortened to four days. It was customary for the Lord Mayor of London to open the fair on St. Bartholomew's Eve. The fair grew to become a vast national market.*

good many steam machines have been converted to electric drive and are still working.

About the same time as steam was introduced, a few enterprising showmen added organs to their roundabouts. At first these were worked by hand, and it was the perquisite (or purgatory) of the younger members of the showman's family to turn the handle. The unfortunate organ operator often had to work in a cramped position, half doubled up on the ground, and in danger of being decapitated by the feet of revolving horses if he raised his head too far.

One of my friends in the show business started his working life when only eight years old by turning the organ on a fairground near Newcastle upon Tyne. Fortunately he escaped premature decapitation and lived to become one of the most famous roundabout proprietors in the country. Around the turn of the century the organ was driven by a little steam engine and being a showman's younger son became a less hazardous calling.

At first the advent of steam to the fairground only increased the speed of the roundabout and eased the work of the operators. The machines, including the engine itself, were still moved from place to place by horses. Later, however, steam traction came into use and with it the production of much heavier and more elaborate rides. Steam engines gave way to petrol and finally to diesel lorries, and it is now two years or more since the last steam-hauled roundabout was seen on the English roads. This belonged to William Presland of Braintree.

Until about fifty years ago, roundabouts were nearly all equipped with wooden horses. They were built up from a number of pieces of wood carved by hand in a very individual style and involving some forty joints. It was possible to identify the maker of a roundabout from the style in which the horses were carved. Today there is only one man still alive who can carve a roundabout horse.

The original horses on British roundabouts were some 6 ft. high, but you have to go to Coney Island, New York, to see one now. These big English roundabout horses were introduced to America by emigrant showmen's carvers, and the original size has persisted there while in England the carved horse became smaller. The American fairground horses are now, however, cast in light metal instead of being carved in wood.

When steam replaced men and horses as motive power the roundabout became heavier and more elaborate. One of the first results of the extra power was to make the horses "gallop." Up to about 1870 all roundabouts followed very closely the original Turkish pattern and consisted simply of seats which whizzed round—rather like the modern "Chair-o-Plane" ride, but of course without the speed. With the advent of steam and "enormous power" (7 horse-power instead of one pony or two boys!) extra gearing was introduced on the centre pole and the horses (and later cockerels and dragons) were made to move up and down as well as go round and round.

This gave an illusion of "galloping"—a great thrill in an age still largely dependent on horse transport—and led to merry-go-rounds being nicknamed "gallopers," the name by which they are still known in the amusement trade. The word "gallopers" is usually prefixed by "Three Abreast" or "Four Abreast" to indicate the size of the machine.

There are several variations of the roundabout. There is the "Moon Rocket," which is simply what a showman would call a "flat ride" with the "flatness" tilted to an angle of about 30°. In another variation of the flat ride the floor of the machine tilts as it turns (with the object of inducing artificial seasickness!). The most famous ride of this kind was probably the "Ocean Wave," which used to be such a feature of the amusement park at Belle Vue, Manchester. Other names for merry-go-rounds are "Autodromes," "Noah's Arks," "Swirls," "Razzle Dazzles" and "Tilt o' Whirls."

Of course, there are lots of other rides on the fairground. But to me none can compare with the thrill of an old-fashioned "galloper" prancing round its circular path to the accompaniment of a steam organ. But any ride is better than no ride; and I would like to end with the words of the "barker" on the "walk-up" at St. Bartholomew's Fair: "Come, who rides, sir? Who rides, sir?"

Dragons in Denmark

By R. N. H. Ambler (Southern Region)

Last autumn six British Dragons were transported to Danish waters on board the Royal yacht *Britannia* and competed against six Danish Dragons. The result was some close and exciting racing during seven happy days, vividly described by a member of Southern Region who helped to crew the British boat *Foil*.

"You start," said Carl, pointing at me. I picked up the big heavy wooden ball and held it uncertainly in my hand. "It's quite easy," he said. "All you have to do is to roll it. Have a trial roll."

So I rolled it. It rolled down the alley like a drunken sailor and ran amok among the skittles at the other end.

"Five!" shouted a voice from the far end.

"Hurrah!" shouted another near my elbow.

"Can I count that one?" I asked Carl, feeling that I might not be so successful with the next four throws.

"O.K.," he said. "Go on."

And so began a friendly match between Denmark and England down in the cellars of the Forest Riders Inn, just outside Copenhagen. We rolled as best we could, Danes and English encouraging their own side and barracking the other, pausing only to refill our glasses with lager or schnapps. This was great fun, and it reflected so well the cheerful, sporting, friendly spirit of our hosts, the Danes, throughout our seven days in Copenhagen.

The result of this match was unimportant. We had come over for something far more serious. We had come to take part in the British-Danish Dragon Meeting. The Duke of Edinburgh, who was visiting Denmark officially, brought over six British Dragons with him on *Britannia*, including the Royal Dragon *Bluebottle*. There was to be a series of races between yachts of the International Dragon Class.

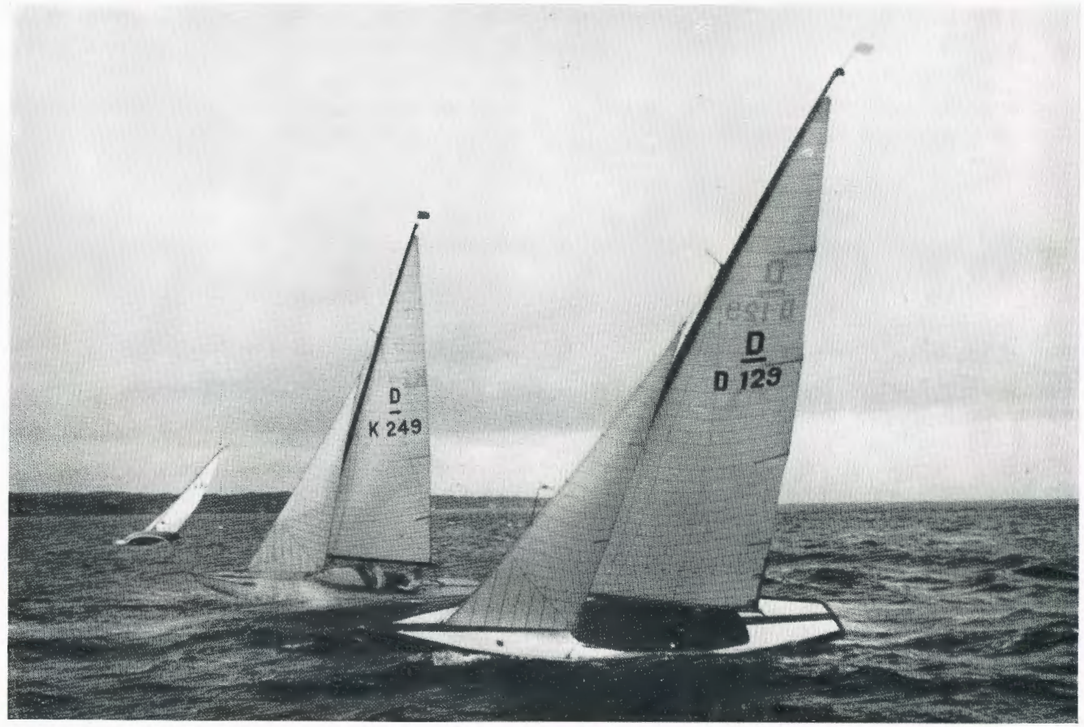
The meeting was arranged at the suggestion of the Duke so that, to prepare for the Olympic Games in 1956, British Dragon helmsmen could gain international experience racing against some of the best helmsmen in Europe. The British boats and their helmsmen were chosen by the Olympic Committee of the Royal Yachting Association. I went as foredeck hand in *Foil*, one of the six Dragons chosen.

After six hours' delay due to fog, we left England in a B.E.A. Viscount, arriving late in the evening of Wednesday, 12th October. We were met by our kind hosts and introduced to Tuborg lager and schnapps before we had time to take in our new surroundings. It was hard to believe we were in another land. Everyone spoke and joked in English—even the girls behind the bar in the Hellerup Sailclub, which was to be our headquarters.

Later I was to find that taxi drivers, tram conductors, shop assistants and policemen had no difficulty in understanding what we wanted and replied in good English. Even the small boys who came to see the Dragons gave expression to their curiosity in English, with only a little trace of accent in it. "Which is Prince Philip's boat?" they would ask and would follow this up with a stream of questions after we had shown them *Bluebottle*. It was all so easy and delightful: we arrived in a foreign country only to find all arrangements made for us, and our hosts ready to receive us and quick to make us feel at home.

Next morning we took a taxi to the boatyard and helped to put in the masts and check the rigging. After a splendid lunch in the Sailclub, washed down by more lager and schnapps, we took the six British Dragons out for a short tuning-up race to get ready for the first day's racing on Friday. The weather was kind, giving us a light but steady breeze which was ideal for our purpose.

That evening we were invited to our first official reception, a cocktail party given by the Danish Dragon Club at Hellerup. At this we met the race committee



The British boat Foil (*K*249), *in which the author was one of the crew, here leads a Danish Dragon during the international sailing match at Copenhagen last autumn*

and the helmsmen and crews of the eighteen Danish Dragons, our competitors during the next four days. And to take our minds away from the tactics and technicalities of yacht racing, and to help us consume more lager, and perhaps to keep us up late, our hosts cunningly provided us with the distracting but delightful company of some young and lovely Danes. An old trick this; but we fell for it just the same, for it was impossible to resist.

I woke early on Friday morning, and after a quick breakfast of Danish bread, eggs and coffee reached the yacht club soon after eight. There was plenty to do and not much time to spare, for the race was due to start at 10 o'clock.

The sky was overcast, but the weather report forecast a light breeze, force 2–3, good visibility and some sunshine. This was typical Danish weather. We are more used to racing in strong winds against a rough sea, with a tidal current to hinder or help us. Here the sea was flat, with very little tide. I did not think much of our chances. The harbour at Hellerup is small, almost totally enclosed, leaving only a narrow gap in the sea wall for boats to leave or enter. It took some time for twenty-four Dragons to get ready, push off, and get out of this small enclosed space. Outside we hoisted the mainsail up as far as it would go and set a spinnaker to run out to the committee boat as quickly as possible.

Then the fun began.

The course was triangular and roughly 12 miles in length, with the starting line in the middle of the base. We had a beat to windward, round the first mark, followed by a reach to the second and third marks, and then finally a long beat to windward along the base of the triangle to finish at the first mark again.

It was a wonderful sight to see twenty-four Dragons manœuvring for the start, trying to keep out of each other's way and yet be first over the line. Helmsmen and crews, we were all concentrating hard, watching the other boats and sensing something of the excitement in the air. A few seconds before the gun we were all racing for the line—some ahead, some

behind—and the leading boats crossed it a moment after the gun fired. We were all across within seventy seconds—a good start.

The feeling of tension left us as we settled down to tacking a zigzag course against the wind for the first mark. It was important to reach it among the first flight, for our positions round this mark would largely determine the order of finishing.

For a long time it was impossible to say which Dragons were in the lead, but as we approached the mark our excitement mounted. It seemed just possible that some of the British boats were in front. Imagine how we felt when we saw our *Vana*, *Bluebottle* and *Tania* round the mark away ahead of the first Danish boat, with the remaining three British boats well up in the next ten. It was almost too good to be true. After a long but exciting race, in which the order of our positions changed frequently, with the Danes doing all they could to break through, it was very satisfying to see *Vana* win and *Bluebottle* and *Tania* come in third and fourth. Our *Rin-Tin*, *Timba* and *Foil* followed up among the next twelve.

The result surprised and delighted the British. It shook the Danes, and you could have floated a Dragon on the quantity of lager drunk during the celebrations, in which our sporting hosts joined. This was a most encouraging start. Could we keep it up? Well, we would try.

We tried very hard during the next three days, but our success had made our opponents more determined to beat us. It was too much for them that their best helmsman, Ole Berntsen, winner of the Dragon Gold Cup, had been beaten into sixth place.

Each day we had strong gusting winds which built up a short sharp sea. This was British weather all right, and someone asked jokingly if we had brought it with us. The Dragons slammed into each wave, throwing the spray in the air and taking a wash of water along the deck to pour over us. The helmsman got most of it in his face, but the two crew still got very wet, in spite of our oilskins. And the wind blew on our wet skin and clothes, making it uncomfortable and difficult to work the sheets and winches. We were very cold. It was easy to make mistakes and lose concentration, but we were encouraged by the battle to improve our positions and by the thought of hot soup when we got in.

Ahead of us, Ole Berntsen in *Tip* led *Bluebottle* and *Vana*, and each day, with unfailing regularity, this was the order of the finish, with the remaining British boats well up. At the end of the four days we added up all the marks. *Tip* came first, just a few points ahead of *Bluebottle*, sailed magnificently by Graham Mann, and *Vana* was third. The Danes were delighted that the Royal Dragon was the leading British boat and second only to Ole Berntsens' *Tip*. We British were pleased, if not a little surprised, to have done so well against such formidable opposition. It was useful, instructive racing, and we were heartened by the results. I could not help feeling that it was a splendid way of finishing the racing season.

There is so much more to tell of our seven days' stay. Racing took only three hours out of each twenty-four, but what happened during the rest of our days would fill a book.

We had very little time to ourselves. Every day there was a reception of one kind or another. We had cocktails at the Royal Danish Yacht Club and at the British Embassy, to which officers from *Britannia* and from the Royal Danish Navy also came.

But the kindest and best reception of all I had from the Danish family with whom I stayed. They looked after me as if I were their son and fed me with many a delightful Danish dish. To live with them was to experience the deepest sense of hospitality I have ever known.

The neatest piece of work I saw was the stowing of the Dragons on *Britannia*. She lay near the Langelinie, where you can see the Little Mermaid, the best-known statue in Denmark. A huge Danish Army crane picked up each Dragon from out of the water, lifted her into the air, and carried her along the quay to *Britannia*, as a cat might carry a mouse. The Dragon was transferred to *Britannia's* crane in mid-air, down went a lifeboat, and the dragon was tucked into her cradle behind the davits, all in a few minutes. No shouting, no fuss; just a few quiet commands, and six Dragons were stowed away safely for their return to England. And when they were snug and comfortable we said goodbye to them and to *Britannia*, wishing her "bon voyage."

It was a sad party that gathered at Kastrup Airport next day. We were sorry to leave so soon, just when we had got to know our new friends well. We did not know how to thank them enough for all they had done. And I think they were sorry to see us go. But each of us left for England taking with us memories of seven happy (if exhausting) days. And next time I drink a schnapps I shall lift it high in the air in tribute and repeat the only Danish word I know—Skøl.

I.C.I. NEWS

ANOTHER £500 SUGGESTION

A Hillhouse process worker, Mr. Griffiths Jones, G.M., has received £500 for a suggestion that has enabled production of nylon monofilament to be increased by 30%.

Mr. Jones' suggestion concerns the operation of nylon spin-melt kettles. In these, nylon chips are melted and extruded as filaments for fishing lines, surgical sutures, bristles and so on. When the factory Award Committee considered the suggested improvement they made an immediate award of £15—the maximum in their power—to Mr. Jones, and referred the suggestion to the Plastics Division Board.

The Division Board made the further award of £500—a sum calculated from the savings to the Company that will be possible over the next three years. At the end of this time the spinning process involved will almost certainly be replaced by a new method, and the actual savings made, if greater than can now be foreseen, may allow a further award to be made.

Mr. Jones was awarded the George Medal and the I.C.I. Bravery Award during the war when he was working at the Ministry of Supply factory operated by General Chemicals Division at Randle. A detonator exploded in a shell container which was being assembled by female operators. Mr. Jones ran into the building on hearing the explosion, picked up the shell and threw it out of the door, where it immediately exploded.

The Suggestion Scheme award to Mr. Jones makes history in Plastics Division. It is the largest award ever made in the Division, and only one other outright award in another Division — that for Alkali Division's "Mighty Mouse" — has been as large.

When Mr. J. C. Swallow, Plastics Division chairman, handed the cheque to Mr. Jones at Hillhouse he spoke of the occasion as quite an historical one. Speaking of Mr. Jones' George Medal, he said: "I did not know, and he did not let it be known, that he is a person of great distinction in his own right. With this presentation," Mr. Swallow went on, "we wish him the very best of luck and every success. It is an occasion which I shall always remember; this suggestion is a symbol of the keenness and interest in improving the product that everyone drives for at Hillhouse."

NEW YEAR HONOURS

Two members of I.C.I. received awards in the New Year Honours List. Mr. F. H. Perkins, the Company's Education Officer, received the O.B.E., and Mr. J. W. McIvor, a shift electrician at Billingham Ammonia Works, the B.E.M.

Mr. Perkins has been I.C.I. Education Officer since April 1946. He started his career as a railway engineering

Mr. Griffiths Jones (left) receives a cheque for £500 from Mr. J. C. Swallow, chairman of Plastics Division

Mr. F. H. Perkins

Mr. J. W. McIvor

apprentice at Derby. He obtained an engineering degree and spent fourteen years in industry (including some years with an engineering firm in Czechoslovakia) before taking teaching posts first at Birmingham Central Technical College and then at the Northampton Polytechnic, London.

In 1941 he joined the Ministry of Education's Inspectorate Branch. He was seconded soon afterwards to the Ministry of Labour. After a fact-finding visit to the U.S.A. in 1943 he launched the Ministry's highly successful "Training Within Industry" scheme.

Mr. Perkins was a member of the Urwick Committee which published a report entitled "Education for Management" in 1946, and he was also a member of a recent Ministry of Labour committee of enquiry which investigated the training of supervisors.

Mr. McIvor has been at Billingham for 27 years. He has been a works councillor since 1938 and is well known in the Billingham district for his many years of public work.

A member of Billingham Urban Council from 1948 until last May, when he was defeated in an election which followed a revision of ward boundaries, Mr. McIvor is on the Durham County Education Authority's South East Divisional Executive Committee.

He is a shop steward for the Electrical Trades Union and has done much work for factory safety. He is also chairman of the Billingham Accident Prevention Committee and chairman of the District Council's Show Committee.

Keenly interested in youth work, he is group scoutmaster of the 1st Haverton Hill Scout Group, which he formed ten years ago, and is vice-chairman of the Parochial Church Council at St. John's Church, Haverton Hill, where he is a chorister.

DEPUTY CHAIRMAN FOR N.C.B.

Mr. S. P. Chambers, C.B., C.I.E., a deputy chairman of I.C.I., has been appointed by the Minister of Fuel and Power as a part time member of the National Coal Board. The appointment was announced at the same time as those of Mr. J. Crawford, J.P., and Mr. W. L. Heywood, O.B.E., both members of the General Council of the T.U.C., and of Sir Henry Wilson Smith, K.C.B., K.B.E., deputy chairman of Powell Duffryn Ltd.

The appointments are for three years and are to fill the places of part time members whose appointments have expired.

SUEZ CONTRACTORS

The Anglo-Egyptian agreement which was signed on 19th October 1954 requires that all British troops shall leave Egypt by June 1956, but provides that in certain events they may reoccupy the Canal Zone. To facilitate this, military installations in the Zone will be maintained by civilian contractors.

At the request of the British Government several prominent British companies, including I.C.I., undertook this maintenance work, and each company formed its own subsidiary contracting company to carry out the work in the Canal Zone. I.C.I. formed Suez Contractors (Ammunition) Ltd. to maintain the ammunition stores in No. 9 Base Ammunition Depot, Abu Sultan.

The Metals and Nobel Divisions were made responsible for the technical organisation and functioning of the new company. The board of directors consists of officials of those two Divisions and of Head Office, Mr. W. Robson (Metals Division Director) being its chairman. The administrative framework of the new organisation was formed by staff seconded from Metals and Nobel Divisions, with Mr. C. E. Dardier and Mr. E. Owen as General Manager and Assistant General Manager. The staff for the remaining eighty posts had to be engaged from outside I.C.I. More than 1600 applications for these posts were received, and after nearly 200 interviews some eighty people were appointed.

Then followed medical examinations, vaccinations, inoculations, and the training of those who required it. Meantime the vanguard of officials, with some staff, had gone to the Canal Zone; they were followed by others at intervals until the final party of 59 employees left the U.K. in two specially chartered planes at the end of October.

Street scene on the Ismailia–Abu Sultan road, on which the depot is situated

Living accommodation for wives and families is now becoming available, and further air charter flights are being arranged for their transport to their new homes.

Mr. H. G. Brown, U.K. manager of Suez Contractors (Ammunition) Ltd., has written the following description of working and living conditions at the Depot.

No. 9 Base Ammunition Depot adjoins the northern shore of the Great Bitter Lake, about twelve miles south of Ismailia. It covers an area of approximately eight square miles (about 5000 acres), with a perimeter of twelve miles. Although it adjoins the Suez Canal and the Great Bitter Lake, which forms part of the Canal waterways, it is in effect in the desert. From what I can recall of the view from the look-out tower on the west side of the Depot, the only relief from featureless sand—other than man-made installations—is the fringe of date palms running alongside an arm of the so-called Sweetwater Canal, which one crosses on entering the Depot.

The signs of human habitation consist, apart from activities in the Depot, of an occasional motor vehicle on the "Treaty" road beyond the western perimeter, and the native with his camel or donkey engaging in his business or apparently just going for a ride. The storage buildings, workshops and administrative offices are, no doubt, adequate for local needs but would not conform to I.C.I. standards in our English climate. But a great deal is being done for the comfort and welfare of those who work there, and the British art of improvising will doubtless adapt Army "issue" to advantage.

The contractors' employees and their families will for the most part live in Tel El-Kebir, Moascar and Kensington Village, Fayid. Because it is fairly close to the Depot, Kensington Village has been allocated to the I.C.I. staff, together with the staff of other contractors whose activities are in this vicinity. It is in many respects the most attractive of the three residential centres. It lies on the south-west shore of the Great Bitter Lake and, apart from French Town, Ismailia, is probably the nearest approach in the Canal Zone to what we understand as a garden city. It is irrigated from a branch of the Sweetwater Canal, and trees and shrubs grow in profusion. Some of the quarters even have their own lawns.

Thus is born a new I.C.I. venture—not one which may bring spectacular developments in the future, but nevertheless one which will be watched with interest by many people both in this country and overseas. This undertaking by a group of civilian contractors of a function normally performed by the Army—and in a foreign country—is unique, and its successful conclusion will undoubtedly add to the prestige not only of the contracting companies but also of this country.

MAGAZINE CIRCULATION STILL GROWING

The steady climb in *Magazine* circulation continues. The number of copies printed last month was 80,000—5000 more than a year ago.

The figures for the last five Januaries are:

January 1952	62,000
January 1953	64,500
January 1954	69,000
January 1955	74,800
January 1956	80,000

BILLINGHAM DIVISION

Mayor entertains Synthonia Cubs

Ten boys from the Synthonia cub pack, with Cubmaster "Buddy" Dale, were entertained in the mayor's parlour at Stockton Town Hall recently. The boys were there at the invitation of the Mayor, Mr. Eric Wiseman, who is an electrical fitter at Billingham Gas and Power Works.

Mr. Wiseman talked to the cubs about the history of Stockton and then took them on a tour of the Town Hall. He also showed them the mayor's chain of office, the town's mace and other pieces of the Corporation plate, explaining the history and significance of each one. The cubs returned the compliment by inviting Mr. Wiseman to the pack's annual party.

Later the same day the Mayor welcomed a second group of visitors from Billingham. They were Mr. A. W. Gifford, Mr. R. B. Haworth, Mr. A. L. Paling and Mr. R. H. Passmore, fellow workers at Gas and Power Works, and Mr. H. Berry, a Gas and Power Works pensioner.

Inter-Division Swimming Contest

The annual swimming match played between General Chemicals Division and the Synthonia swimming section, won this year by Synthonia, may well have been the last of the series. Plans for the match to be replaced by a four-cornered contest, bringing in Alkali and Dyestuffs Divisions, were announced at the annual general meeting of the Synthonia swimming section. The match would be held once yearly at Runcorn, Winnington, Manchester and Billingham in turn.

DYESTUFFS DIVISION

Perkin Centenary Plans

The year 1956 marks the centenary of the discovery by William Henry Perkin of the first synthetic dyestuff, "mauve." From this discovery have developed the modern dyestuffs industry and the greater part of the world's organic chemical industries.

The centenary is of particular interest to Dyestuffs Division; not only are they by far the most important manufacturers of dyestuffs in this country, but they are also direct descendants of the firm of Perkin & Sons, whose small factory at Greenford Green, Middlesex, was built specially to make the new dyestuff.

The main celebrations of the centenary, under the patronage of H.R.H. the Duke of Edinburgh, will take

place in May. The Society of Dyers and Colourists, who inaugurated plans for the celebrations, have been joined by other learned and scientific bodies, and detailed arrangements are now being made. The sponsors, in addition to the Society of Dyers and Colourists, are the Royal Society, the Chemical Society, the Society of Chemical Industry, the Royal Institute of Chemistry and the Association of British Chemical Manufacturers.

An influential organising committee has been set up under the chairmanship of Sir Robert Robinson, O.M., F.R.S. Several sub-committees have also been set up to deal with individual aspects of the celebration, and among the chairmen of these are Dr. C. J. T. Cronshaw (a former director of I.C.I.), Executive Committee; Mr. H. Jackson (a Dyestuffs Division managing director), Finance Committee; and Mr. R. J. Smith (Division Publicity Manager), Publicity Committee.

An appeal is being made for a £100,000 fund which is to be used mainly as a trust fund which will finance Perkin Centenary Scholarships intended to promote, advance and encourage technical education in relation to all aspects of the fabrication or application of colouring matters.

The most important part of the celebration will take the form of a series of five lectures by eminent people, dealing with the effects of Perkin's discovery on life and industry during the past hundred years. These lectures will be given in London in early May. During this period a banquet will be held, at which it is hoped the Duke of Edinburgh will be present, and a conversazione, which will give opportunities for overseas and British delegates to the celebration to meet.

An article on Perkin, the man and his discovery, will be published in the May issue of the *Magazine*.

METALS DIVISION

Kirkby Hero

Mr. Thomas O'Connor, who is employed at Kirkby Works, heard a cry for help from the flood-tide waters of the Mersey, dived in with a lifebelt, reached a drowning man, and struggled gallantly until a motor launch arrived to bear them to safety, en route to hospital. A police report on the incident states: "There is no doubt that the courage and promptitude of Mr. O'Connor saved the man's life."

Mr. T. O'Connor

The rescuer, who served in the Royal Navy from 1926 to 1952, was so reticent about the matter that nothing was heard of it until the Liverpool Shipwreck and Humane Society awarded him a certificate recently.

NOBEL DIVISION

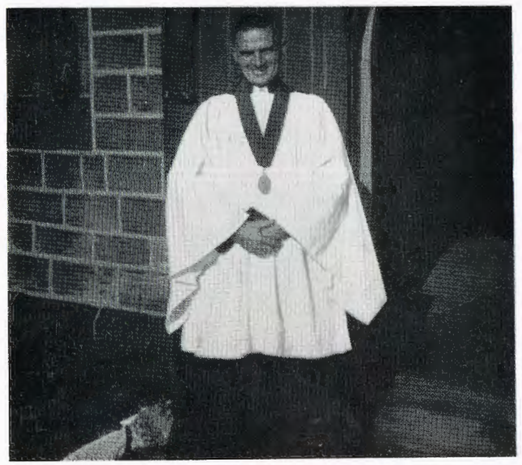
Lay Preacher

For Mr. George Mason, a processman at Roburite Factory, Sundays are almost as busy as workdays. As a licensed lay preacher of the Church of England his Sunday often begins at 7.45 a.m. with Holy Communion; morning service follows at 10.30, a men's service at 2.30, and evening service at 6.30.

In addition Mr. Mason devotes an average of three nights a week to the affairs of the church in his parish, and travels outside the parish as a guest preacher.

Although Mr. Mason's licence to preach dates only from 1952, he has been a lay reader for much longer. In 1946, when he took over the men's service at his church, there were only 24 members. Today membership has swelled to 136.

Mr. Mason was licensed after taking a written and oral examination set by the Diocese of Liverpool and is one of



Mr. George Mason, a processman at Roburite Factory and spare-time preacher

fewer than forty lay preachers in the Deanery of Wigan. Another of his interests in life has been the Boy Scout movement, in which he has spent over a quarter of a century.

Fifty Awards in a Year

One dog, three prizes. That was the achievement of Mr. William Cherry's golden retriever bitch, Ardeer Gem, at Prestwick Dog Show on 26th November, when she took first, second and third places.

In the short space of a year Mr. Cherry, a rigger in Blackpowder Department, has won a total of fifty awards with Ardeer Gem, only a two-year-old.

Three of these successes were gained at Crufts. The remainder include first prizes from championship shows in Glasgow, Edinburgh, Ayr, Belfast and Blackpool.

Mr. William Cherry with his prizewinning bitch Ardeer Gem

With such an impressive record in a relatively short space of time Mr. Cherry has high hopes of Ardeer Gem becoming a champion. One of her pups, too, shows every sign of reaching championship class.

Organist's Twentieth Anniversary

On New Year's Day Mr. James Gillespie, Engineering Foreman at Westquarter Factory, completed 20 years' service as choirmaster and organist at Kerse Parish Church, Stirling.

Mr. Gillespie has been a church organist since he was 15, firstly at Reddingmuirhead Methodist Church, where he started by sharing the duties with his uncle, and later at Polmont North Church. He was appointed to his present post, from a short list of eight candidates, by Professor A. M. Henderson of Glasgow University. For his audition he played Bach and Rheinberger.

In his twenty years at Kerse Mr. Gillespie made a very considerable impact on the musical life of the district, especially as conductor of the Kerse choir. In addition to normal church music he has produced a number of oratorios with great success.

Music in the church is music in its highest application, Mr. Gillespie believes, and it is his one completely absorbing spare-time activity.

THE REGIONS

Mr. R. L. Bewick

Mr. R. L. Bewick, M.B.E., T.D., Deputy Manager of the Southern Sales Region, has been seconded for a period of some months to the staff of H.R.H. the Duke of Edinburgh's Study Conference on the human problems of industrial communities within the Commonwealth and Europe.

The conference is to be held in Oxford from 9th to 27th July. During the course of it, groups will disperse to provincial centres and London for study tours. Mr. Bewick's task will be to organise the London tours.

There will be 280 members of the conference, drawn from all over the United Kingdom, the Commonwealth and the Empire. They will be youngish men and women holding responsible positions in industry or likely to do so soon. Some will be employers or managers, others trade unionists or operatives.

Mr. Bewick has been Deputy Manager of Southern Region since 1953 and has been with I.C.I. since 1932. During the war he served with an intelligence unit of the Royal Fusiliers. (*Picture on page* 61.)

A.E. & C.I.

Superphosphate Plant for Rhodesia

Plans for the construction of a £3,000,000 plant at Rodia Factory, near Salisbury, for the manufacture of superphosphate by its associated Rhodesian company were recently announced by A.E. & C.I. A granulation plant is also being installed so that fertilizer products can be produced there in both powder and granular form. These plant extensions should be completed by 1958.

Superphosphate has hitherto been imported from the Union of South Africa and from overseas, but the new plant in Rhodesia will have an initial capacity sufficient to meet the full requirements of superphosphate (both single- and triple-super) for fertilizer purposes in the territories comprising the Central African Federation for some years ahead.

The superphosphate project includes both phosphoric acid and sulphuric acid plants, the latter of which will use pyrites mined in Southern Rhodesia as its raw material. It is hoped that these developments in the chemical field will help to promote other industrial development in the Central African Federation.

* * *

OUR NEXT ISSUE

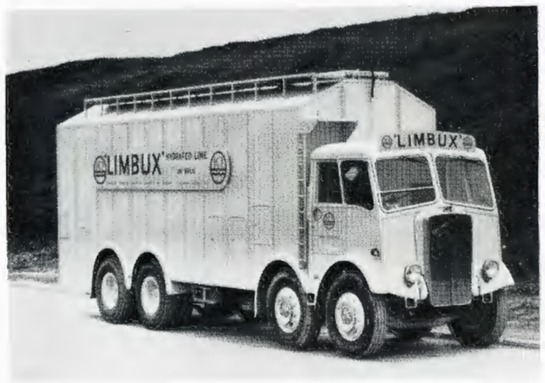
A plastic for which the demand grows steadily year by year is polythene, discovered by Alkali Division just before the war. And one of the most interesting uses of polythene is in the form of film, a few thousandths of an inch thick and used for everything from drum liners to frozen poultry packages. The managing director of the I.C.I. subsidiary British Visqueen Ltd., which makes polythene film, tells in our leading article the story of the development and potentialities of this material.

Our colour feature is based on some splendid photographs taken by Mr. M. J. Hackney, recently retired from the staff of I.C.I. (India). A keen botanist, he visited the foothills of the Himalayas specially in order to take photographs there of the wild flowers which are the progenitors of so many plants growing today in English gardens.

Lastly, Miss J. Brown, formerly of Salt Division and now a recent recruit of Metals Division, contributes an extraordinarily vivid and powerful article on a bullfight in Barcelona.

NEWS IN PICTURES

New vehicle *for delivering 'Limbux' hydrated lime to customers in the building industry is being used by Lime Division. A modified bulk flour transporter, it discharges load by compressed-air blowers. Picture above shows vehicle discharging at works of L. Dennis & Co., Walkden. Tall bunkers on the left are 'Limbux' silos. Below : Another view of the vehicle*



"Barnmoor Farm — *Milk from 40 Acres" is title of the latest I.C.I. film for farmers. The film shows how a Warwickshire farmer has doubled milk output in 5 years by the use of fertilizers and scientific grassland management*

Nineteen miles *of I.C.I. copper tubing, as well as I.C.I. condenser tubes and plates and 'Terylene' furnishing fabrics, went into new Cunard liner "Carinthia," launched by Princess Margaret. Ship's maiden voyage to St. Lawrence is in June*

Boots *of one pot-holing Billingham apprentice, Eric Shield, are watched by another, John Tierney, as they disappear through crack during exploration of underground cave. Both belong to West Hartlepool Technical College's "Clinker Club"*

Girls *of the Ardeer Detonator Department recently celebrated a million man-hours worked without one lost time accident*

Runcorn–Widnes *transporter bridge, condemned after fifty years, is to be replaced by this modern structure, shown here by courtesy of the designers, Messrs. Mott, Hay and Anderson. Work on the new bridge is expected to begin in a few months*

Annual concert *by the Blackley orchestra included works by Beethoven, Bizet and Schubert. The orchestra, one of the few in I.C.I., has more than doubled its membership since it was formed in* 1945, *and now numbers some* 30 *players*

Winner *of £*500 *award for suggestion at Hillhouse nylon plant, Mr. Griffiths Jones, is holder of George Medal and I.C.I. Bravery Award. Story on p.* 53

Medal *for his work at day-release and evening classes was awarded to Billingham apprentice plater Roland Graham by British Constructional Steelworks Association*

Mr. R. L. Bewick, *deputy manager of Southern Sales Region, has been seconded to the staff of the Duke of Edinburgh's forthcoming Study Conference for special work in London. Full story on page* 57

Team *sent to Pretoria centenary celebrations by Royal Scottish Country Dance Society included a Nobel Division man Mr. W. Hamilton (extreme right). Dancers also toured sixteen other towns*

J. P. Quinn (*left*) *of General Chemicals and* **D. F. Allison** *of Metals were selected for third England Rugby trial. Injury prevented Quinn from playing, but Allison was selected for the game against Wales*

Hockey. *Bakhtawar Singh from Huddersfield Works Maintenance Department was selected to play for Yorkshire in county matches*

Mr. B. A. Fixsen, *first Division Staff Manager ever appointed in I.C.I., has retired from Dyestuffs. He is seen (left) receiving presentation from Division Joint Managing Director, Mr. H. Smith*

The Three Beares

A Modern Fairy Tale

By Daisy Grocock

Illustrated by Susan Einzig

"MORNING! You are the new typist, I suppose?" growled Major Beare of Beare, Beare and Beare, Den Alley, E.C.1. "What's your name?"

"Goldie," said the typist, smoothing her fair hair.

"You are quite competent, I hope; I have a great deal of work, I dictate very fast and I don't like mistakes. Our Miss Tappitt has been with us twenty years and has now fallen ill—very inconsiderate."

Major Beare was long and thin and had small eyes which gleamed angrily when he saw she was about to seat herself at the table. "That is my chair!" he shouted. "You are not to sit on that—there is your seat." He pointed to a high, hard chair in the middle of the room.

"Oh dear," thought Goldie, "what a bad-tempered man; and this chair is so uncomfortable and there is nothing to rest my book on."

"Really, I do feel a bit unstuck," she said to herself when she got back to her room after taking Major Beare's rapid dictation for more than an hour. "I suppose I must type his horrid letters, but what a polar bear—much too cold!"

Just as she began to type, the buzzer rang from No. 2 room; she looked at the name on the door as she went in, and thought: "Mr. Secundus Beare—I hope he will be a bit less frigid." She found he was—and how! He was much shorter and rounder than his brother and looked as if he ate (and drank) much more heartily.

"Well! Our new typist—and a real platinum blonde, as I live and inhale. Don't often see anything like you round here, my dear. Poor Miss Tappitt, now—awful old trout. Very efficient and all that; pleases my brother, but I find her a bit wearing. I have a few letters for you, but I don't dictate at all fast and expect a few mistakes from a nice girl like you. Here is a very comfortable chair, and you can rest your book on my desk."

He took a long time to dictate some rambling letters and finished up by stroking Goldie's hair and inviting her to come out with him for a drink and a spot of lunch.

"I'm sorry," said Goldie, "but I've so much work for Major Beare that I shall have time only for a sandwich."

"That's just like my brother," grumbled Secundus Beare. "Awful fellow, likes work or something—most unbearable!"

"Well, that was much too hot," said Goldie when she was back in her small, dark typing den, trying to repair her make-up. Then the bell of No. 3 room rang: Mr. Tertius Beare, said the label on the door. Mr. Tertius was a young brown Beare—not too tall and not too short, not too fat and not too thin; his expression was kind and his blue eyes twinkled. The room was small and cosy.

"I really sent for you to see if you are settling down all right, Miss Goldie; I have a few letters I would like copied—not much. Have you seen my uncles?"

"Yes," said Goldie, looking a bit worried. "I have a great deal of work for Major Beare and a little for Mr. Secundus."

"Well, don't take my uncle Major too seriously; he's not a bad old Beare really; in fact, Uncle Secundus' hug is apt to be worse than Uncle Major's bite, if you know what I mean."

Goldie said that she had already discovered that. Back in her room she thought "Now, *he*'s just right; not too cold and not too hot."

Major Beare returned from lunch grumpier than ever; the bulls had managed to inflate the stock market in spite of cold blasts from Russia and he had been forced to "sell a bear"—not a relation, of course, but part of his precious stocks and shares, which were all he really cared about. Also he had eaten far too much lunch and felt (and was) most unpleasant.

"Really, I do feel a bit unstuck . . ."

On the other hand, Mr. Secundus Beare had not eaten much but had taken a great deal to drink, so that Goldie found him very difficult indeed and had to make a cup of strong tea to bring him to.

She thought she would never finish all the letters; but Mr. Tertius Beare was very kind, read each letter through for errors as she finished them, addressed the envelopes and helped her with the post so that she got away in time to stand the usual twenty minutes in a bus queue and catch the 6.10 train, where she joined her friend Brownie and made her giggle at the story of her day in the Beares' den.

"Well, what a cheek to expect all that work!" said Brownie. "I'd call it a day, my dear, and not go back tomorrow; in these times you can get another job at once."

"I don't think I will, though," said Goldie. "I'll have another stab at it tomorrow. After all," she added reflectively, "there's always the youngest Beare."

"Arena"

Photo by A. R. Steed (formerly of The Kynoch Press, London)